IlluminaCompute Systems

Simplified computation for production-scale sequencing.

- **High Performance**
  Latest computing and storage innovations from Dell and EMC Isilon. Pre-installed software optimized for Illumina sequencing.
- **Rapid Deployment**
  No pre-existing IT needed. Expertise to get labs operational within weeks, not months.
- **Peace of Mind**
  Single-source solution for the entire sequencing workflow. Implemented at key sequencing centers around the globe.

Introduction

Massively parallel sequencing by synthesis (SBS) technology has transformed the way genomic research questions are asked and answered. Illumina sequencing is the most widely adopted and accurate next-generation sequencing (NGS) technology available.

As the output capacity of sequencing systems has exploded in recent years, developing and maintaining an IT infrastructure to support the massive amounts of data has become costly and time prohibitive for many labs.

For labs without access to IT resources or prior experience with massive data volumes, setting up the computing and storage infrastructure for downstream data analysis can be challenging. The lengthy process involves designing the network and infrastructure, sourcing and optimizing the hardware, building the solution, integrating third-party software, and troubleshooting the final system. Once the system is constructed, it must be supported and integrated with new software from multiple vendors over time.

Figure 1: A Turnkey Solution for Every Lab's Needs

Standard System
- Lowest price point
- Ideal for genome/day

Advanced System
- Storage scalability
- Compute scalability
- Fast turnaround time

Two solutions to accommodate a range of lab types.

IlluminaCompute provides the solution to enable genomic researchers to focus on science with a reliable, simple environment to process and store data (Figure 1).

Table 1: IlluminaCompute Solutions

	Standard System	Advanced System
Number of HiScanSQ™ systems supported	4	8
Number of HiSeq® 1500 systems supported	2	4–14
Number of HiSeq® 2500 or NextSeq™ systems supported	1 (100 Gb run)	2–7
Expandable storage	✓	✓
Expandable compute	✗	✓
On-site configuration and installation	✓	✓
IlluminaCompute software suite*	✓	✓
Genomes stored (human BAMs)**	200–400	220–770

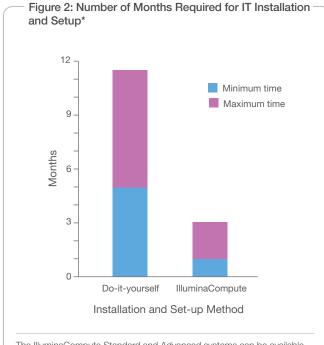* Software for management of configuration and installation of the nodes and cluster monitoring, job scheduling;
** Second number corresponds to base system plus upgrades;
MB: megabyte, GB: gigabyte, TB: terabyte, PB: petabyte, Gb: gigabase.

✓ : available   ✗ : not available

Solution Overview

IlluminaCompute provides a complete, optimized hardware and software solution that features the latest computational and storage innovations from Dell and EMC Isilon. Two separate solutions are available to accommodate a range of data processing and storage needs for labs of all sizes (Table 1 and 2). IlluminaCompute solutions are specifically designed, built, and bench marked for Illumina hardware and software. Each is delivered with pre-installed software for data processing, alignment, and variant detection, allowing labs to immediately begin downstream data analysis. Illumina expertise enables labs to become fully operational in as little as one month, even with no pre-existing IT infrastructure (Figure 2). Having Illumina as a single point of contact allows researchers to reduce maintenance cost and avoid the hassle of managing multiple vendors.

- **The IlluminaCompute Standard System** features the lowest price point, ideal for small labs that support a limited number of instruments and store up to 400 genomes.
- **The IlluminaCompute Advanced System** is a scalable solution that provides fast data turnaround and high capacity storage. The system can support up to seven HiSeq systems.

Figure 2: Number of Months Required for IT Installation and Setup*

The IlluminaCompute Standard and Advanced systems can be available 3–5 months sooner than a do-it-yourself setup, with minimal hands-on time.

*Times are based on field observations by Illumina at customer sites with large-scale data and little or no pre-existing IT infrastructure.

Table 2: IlluminaCompute System Component Information

	Standard System	Advanced System
Isilon folder-based data segregation and PB scalability	✘	✓
I/O bandwidths scaling from 500 MB/s to many GB/s	✘	✓
Dell rackmount servers with 4 GB RAM per core	✓	✓
Fault-tolerant, high availability blade chassis	✘	✘
10 Gbit/s bandwidth	✘	✓
Low power consumption and heat generation	✓	✓
Platform Cluster Manager, Open Grid Schedulerfor job scheduling	✓	✓
Usable disk space (TB)	20–40	22–77
GB of memory	128	144–624

✓: available   ✘: not available

Ordering Information

Base Configurations	Catalog No.
IlluminaCompute Standard System (110V)	SE-401-1004
IlluminaCompute Standard System (220V)	SE-401-1005
IlluminaCompute Advanced System (208V)	SE-401-1204
IlluminaCompute Advanced System (220V)	SE-401-1205

Accessories	
IlluminaCompute Advanced Near Line Archive Storage Cluster (108 TB, 3 nodes)	SE-401-3001
IlluminaCompute Advances Near Line Archive Storage (108 TB, 1 node)	SE-401-3002
IlluminaCompute Advanced Near Line Archive Storage Cluster (72 TB, 3 nodes)	SE-401-3003
IlluminaCompute Advance Near Line Archive Storage (72 TB, 1 node)	SE-401-3004
IlluminaCompute Advanced Chassis (208V)	SE-403-2001
IlluminaCompute Advanced Chassis (220V)	SE-403-2002

Compute and Storage Upgrades	
IlluminaCompute v2 Standard Storage	SE-401-1006
IlluminaCompute v2 Advanced Compute and Storage	SE-401-1206
IlluminaCompute v2 Advanced and v1 Tier 1 Storage	SE-401-3005

Peace of Mind to Focus on Research

The IlluminaCompute solution was designed based on solutions implemented at key genome centers and has an install base of more than 100 instruments worldwide, including Illumina's Services, manufacturing, and R&D labs. Once a customer purchases a system, Illumina field personnel will perform on-site installation and validation using optimized procedures to ensure labs are up and running within 48 hours of installation. All IlluminaCompute solutions come with four hours of Dell ProSupport for key components, and Illumina escalation support for three years, with an option to purchase remote systems administration services.

Summary

IlluminaCompute provides a complete solution for processing and storing NGS data. Three unique systems are available to meet the needs of any research lab. Rapid setup and maintenance, coupled with unmatched performance, provide labs with simplicity and proven reliability for all their IT needs. IlluminaCompute allows researchers to focus on science, rather than setting up and maintaining an IT infrastructure.

Learn More

For more information about Illumina sequencing technology and data analysis solutions, visit www.illumina.com/sequencing.